To my good friend Allan, with very best wishes,
Paul

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Indo-European Consonantism and the New Look.

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Indo-European Consonantism and the New Look.

I. The evolution of a view of the consonant system of Proto-Indo-European in which voiceless aspirate stops came to be regarded as a secondary, dialectal development has caused several investigators to question the resultant array of three stops at each point of articulation, with one voiceless and two voiced. The typological improbability of such a system was pointed out notably by JAKOBSON in his well-known statement (1971 : 528) : " To my knowledge no language adds to the pair /t/-/d/ a voiced aspirate without having its voiceless counterpart /t^h/, while /t/, /d/, and /t^h/ frequently occur without the comparatively rare /d^h/, and such a stratification is easily explainable. " The same point was made by MARTINET (1955 : 115) : « Une série du type bh, dh, gh ne paraît attestée que dans les langues où existe aussi une série de sourdes aspirées ph, th, kh ... on voit mal comment bh, dh, gh pourraient être les seules aspirées d'un système autrement qu'à titre transitoire. Aujourd'hui, où l'on tend à dénier à l'indo-européen commun une série de sourdes aspirées, il convient de remarquer le problème de la marque de la série dite des sonores aspirées. » Partly as a result of the surge of interest in questions of typology of languages and language universals, several attempts have been made to reinterpret the original Proto-Indo-European system of stops in order to remove the troublesome problem of its apparent lack of conformity to known consonant systems. In this paper some of these attempts will be reviewed.

II. The observation of Oswald SZEMERÉNYI (1967 : 89), in reference to the views of JAKOBSON and MARTINET, states succinctly the choices facing the linguist : " The inference is clear : we must either return to the previous (Brugmannian) system of four orders, e.g. /t d th dh/ which makes phonemic sense *sub specie universalium,* or else we must reinterpret the phonological relations at present symbolized by /t d dh/. What we cannot do is to go on using these last symbols as if we really meant voiced aspirate stops when we used the symbol /dh/. " SZEMERÉNYI's " New Look " of Indo-European, which he claims as the " first attempt to present an integrated and typologically acceptable view of the IE phonological system " (1967: 97), is heavily committed to the traditional (Neogrammarian) reconstruction of the PIE phonological system. It adds to BRUGMANN's reconstruction only the phoneme /h/, which is " implied " by the presence of voiced and voiceless aspirates (p. 89) and attested to by the Hittite evidence. Beside this relatively simple consonant system is an ample array of vowels: the classical five-vowel system with long and short pairs at each point. Although in this paper I am concerned mainly with the system of stops, it should also be remarked that in reconstructing the rich five-timbred vowel system proposed by the neogrammarians, SZEMERÉNYI emphasizes that the proportion of vowels to consonants which this reconstruction brings about makes Indo-European an " average " language with respect to the vowel/consonant ratio. It is thus in contrast with the analysis of the " Old Look " with its reduced number of vowels (or even absence of vowels) and expanded number of consonants, including various laryngeals. If the Old Look was bringing Proto-Indo-European close to the picture of a language of the Kabardian or Ubykh type, rich in obstruents and poor in vowels, the New Look revives the older idea of a proto-language having approximately the vowel system of Latin and the consonant system of Sanskrit.

General considerations would indeed suggest that for the period of Indo-European about which we can speak with more than unwarranted speculation more vowels would be expected than the single or zero vowel sometimes posited. One important argument is the fact that in languages with impoverished vowel systems, the complement of obstruents is always made up with a quite rich series of affricates in the front of the mouth. The laryngeal theory usually assigns 'lost consonants' to the velar or post-velar (glottal, pharyngeal) areas. BENVENISTE (1937: 139-147; 1954: 29-38; 1962: 8) attempted to add to the traditionally accepted system several affricates, but the evidence is either scanty or else lends itself to better explanations. The Proto-Indo-European of moderate depth does not look phonologically like a Northern Caucasian language of the Kabardian type, with its crowded dental-to-palatal obstruents and rich array of laterals in addition to post-velar, pharyngeal, and glottal phonemes. We should therefore not expect typologically to find a small number of vowels, even at the phonemic level. SZEMERÉNYI's conclusion on this (1967: 87) is thus surely correct, even though one might quarrel with certain aspects of his argument (1), and suggests the further conclusion that we should not separate the time depth at which prehistorical stages of the vowel system are posited from the time-depth of hypothesized consonant systems; those who are prepared to reconstruct a stage having no or only one vowel must also be prepared to justify a correspondingly rich array of obstruents for the same stage.

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(1) SZEMERÉNYI quotes MARTINET (1955: 233), who observes that a Proto-Indo-European with only 21 consonants and one vowel would have had too meagre a phonology to function effectively. SZEMERÉNYI disputes this by pointing to Ubykh, with its supposed 80 consonants and four vowels, a consonant/vowel ratio similar to the Indo-European of the Old Look. Yet MARTINET is surely right, and this concession by SZEMERÉNYI is unnecessary. What is important is not the consonant/

SZEMERÉNYI's New Look includes a crucial role for voiceless aspirated stops. These stops provide the phonological balance to the voiced aspirates required by JAKOBSON's and MARTINET's universal, giving Proto-Indo-European the same four-cornered stop system as that of Sanskrit, i.e. with voiced and voiceless aspirates and voiced and voiceless unaspirated stops. In his 1967 article, SZEMERÉNYI offers no evidence for the reconstruction of voiceless aspirates beyond the purely typological one; the typological argument remains the principal pillar for voiceless aspirates in the proto-language in the summary of his views found in the *Einführung in die Vergleichende Sprachwissenschaft* (1970: 136). Since the implicational universal forces the investigator to assume their existence *a priori,* the task is apparently not so much that of reconstructing voiceless aspirates from available evidence, but rather that of looking for indications of entities known to be present and finding arguments against any counter-indications. It cannot be disputed that the dialectal evidence for these phonemes as reflexes of the same sounds in Proto-Indo-European is scanty and a matter of controversy, cf. LEHMANN: 1955, 80-84 for discussion and literature, and POLOMÉ: 1971, 233-251 for more recent — but not essentially different — viewpoints: that supposed reflexes of voiceless aspirates in dialects other than Indo-Iranian are probably explicable as analogical or other secondary developments, and that at least some of the Indo-Iranian examples are monophonematic reflexes of fairly recent stop + laryngeal clusters. Other Indo-Iranian voiceless aspirates might be traced to devoicing of voiced aspirates after initial *s,* and the number of occurrences of these sounds was increased by the addition of loan words from Dravidian (POLOMÉ: 1971, 243). In any case, the number of secure cognates of voiceless aspirates in Indo-European roots is so minute that their existence in the proto-language in contrast to unaspirated voiceless stops is *a priori* suspicious. It is only the very strong suggestion of their existence as " implied " by the typological argument which almost forces Indo-

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vowel ratio alone, but this ratio combined with the absolute number of vowels. Impoverished consonant systems are perfectly viable, as some of the Polynesian languages show, so long as the number of vowels is relatively rich. Most Indo-Europeanists agree in reconstructing a relatively simple consonant system, and this implies several vowels. Language typology suggests that unless we are willing to increase substantially the number of original consonants (and I mean by a factor of two or three, i.e. a total consonant system in the number of 40 to 60), we must admit several vowels.

Europeanists to admit their presence, unless they wish to deny the validity of the typological argument.

III. An alternative to this dilemma — that the classical Indo-European consonant system required the positing of a set of phonemes for which the evidence was scant and highly controversial — was to re-examine the three series of stops for which secure evidence existed, that is the voiced and voiceless unaspirated stops and the voiced aspirates, to see whether the Proto-Indo-European system could be made typologically realistic by reinterpreting one or more of the sets of stops. There appear to be four solutions which have been regarded as workable alternatives, none of which has found widespread acceptance in the sense of having been incorporated into several handbooks by different authors, formed the basis of extended journal discussion, etc. They are as follows: 1. regard the primary distinction as that between voiced and voiceless stops, with the Voiced Aspirates (1) regarded as lax fricatives; 2. posit " emphatic " consonants of the Semitic type as predecessors of the Voiced Aspirates; 3. interpret the Plain Voiced stops as the lax counterparts of the (tense) voiceless stops; and 4. replace the Plain Voiced stops with glottalized stops. Of these, 1) and 2) involve regarding the voiced aspirates as the " strangers in the camp " and assigning the primary phonological role to the plain voiced and voiceless stops. In 3) and 4) the voiced aspirates play a fuller role as the sole representatives of voiced stops.

The suggestion that the Proto-Indo-European Voiced Aspirates (2) were spirants is most prominently associated with PROKOSCH, who was warmly supported by COLLITZ. The outline of PROKOSCH's argument was as follows: Aspirated stops are especially characteristic of Tibeto-Burmese languages, but are rare elsewhere; since they also occur in Munda and Dravidian languages, the Indic languages could easily have taken them over by sound-substitution, converting the fricatives into voiced aspirated stops and introducing autonomous voiceless aspirates which had already existed as allophones of voiceless stops in Proto-Indo-European. The Voiceless Aspirates of Classical Greek, which became fricatives soon after the classical period in the standard view, may in fact have been fricatives since the Proto-Indo-European period. The assumption of aspirated stops in earlier Greek places Greek outside the pale of European languages and alligns it with Sanskrit rather than with Latin. " If these sounds were not sonant aspirates, they almost *must* have been spirants. It is nearly unthinkable that voiced spirants became voiceless spirants in Italic (and possibly in Greek); therefore only voiceless spirants are left, so that Italic would have preserved the original Indo-European articulation " (Prokosch, 1939: 40). These fricatives were comparable to the fricatives of Old English and Old Norse in having voiced and voiceless allophones (not necessarily in the same environments as the Germanic fricatives, however). The principal allophones were " voiceless lenes spirants " (for which Prokosch used the notation, *ϕ, ϑ,* and χ).

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(1) Initial capitals are used in this paper to identify the traditional features of reconstructed phonemes, without regard to the particular interpretation under discussion.

(2) David STAMPE has drawn my attention to certain dialects of English, such as Kentish and Somerset, which apparently have only voiced, and no voiceless fricatives. Such a system can scarcely have been found in Proto-Indo-European, however, because the evidence for voicelessness in the proto-phoneme */s/ is unimpeachable, and the British dialects cited voice all fricatives.

The proposal to interpret the Proto-Indo-European Voiced Aspirants as fricatives is not easily disposed of. A change from fricative to homorganic stop is a common and widespread occurrence, particularly when sound substitution is involved in a language whose phonemic system lacks a particular fricative type; compare Georgian *prop'esori* " professor " (with aspirated *p'* for *f* in the borrowed word), Malay *pikir* " to think ", *kabar* " news " (*p* and *k* representing Arabic *f, x* in nonlearned pronunciation), and countless other examples. The process is well-known within Indo-European also, as examples such as Latin *ruber* " red " from earlier **ruf-* (Indo-European **rowdh-*), the change of *þ* to *d* in later Germanic dialects, etc., reveal. It is necessary, of course, to posit this change in almost all the Indo-European dialects, the only fairly certain exception being Italic; but this fact cannot itself stand as an argument against Prokosch's theory, since any attempt to reinterpret the traditionally proposed obstruent system of Proto-Indo-European requires the concession of a widespread change of one series of stops into another, and unless we are prepared to make this concession, the traditional picture must be accepted in spite of its obvious disadvantages.

Unfortunately, most of Prokosch's arguments are not linguistic or philological, but are based on general phonetic grounds. These grounds are moreover not descriptive but derive from certain assumptions about the directionality of sound change, or " drift " in Sapir's sense. One of the crucial arguments, for example, involves the Sound Shifts of Germanic: " Man kann nicht umhin, anzunehmen, dass der Sprachgeschichte der germanischen Sonderzeit eine organisch gleiche oder ähnliche Entwicklungsrichtung schon im Indogermanischen vorhergegangen sein muss. Soweit wir einen Übergang von bh, dh, gh zu ƀ, đ, ǥ überhaupt beurteilen können, muss er als Lautminderung aufgefasst werden; die weitere reingermanische Konsonantenentwicklung aber ist eine gleichmässige Steigerung. Der Widerspruch ist unerklärlich " (Prokosch, 1918-19: 546). This reasoning begins, then, from the *a priori* assumption that the diachronic continuum between Proto-Indo-European and modern Germanic must be seen as an organic whole in which all changes are in conformity with a single phonetic principle. It then follows that any phonological reconstructions which skew the fundamental principle must be altered. Even if we were to grant the existence of drift on this enormous diachronic scale, it is by no means clear that its essence could be captured by a vague term such as Steigerung, especially if this expression has to function as a descriptor of the change from voiceless aspirates to voiceless fricatives, but is explicitly excluded from referring to a change of voiced aspirates into voiced fricatives. For these reasons I find PROKOSCH's justification unconvincing. But this still does not dispose of the theory itself. Unfortunately, when we look for dialectical evidence of earlier fricative pronunciation of the Voiced Aspirates, the picture is not encouraging. In Germanic the development Voiced Aspirates > Voiced Fricatives which is generally assumed in the handbooks (e.g. HIRT: 1931, 84; STREITBERG: 1963, 116) is assured only for interior environments. For the initial position we do not have to assume fricatives, and MOULTON's summary (1972: 142-143) posits initial stops except perhaps in the velar series. It is thus just as easy to assume fricativization of medial stops as occlusivization of initial fricatives. It is only intervocalically that the falling together of PIE **bh* (etc.) with PIE **p* (etc.) under VERNER's Law conditions forces one to posit voiced fricatives. Accordingly we are left with Italic to provide the sole evidence for fricatives, unless we are to assume, against all indications, that the Greek aspirates were fricatives all along. Now in the case of Italic there can be little question but that the reflexes of Indo-European Voiced Aspirates were voiceless fricatives in most environments (see WALDE: 1916, 182-83), and where this development is in question, as after nasals, there is no reason not to regard the fricatives as primary. In view of the other dialectical reflexes of Voiced Aspirates, however, in which stop articulation is overwhelmingly predominant, a much more natural explanation of the Italic development is that from original voiceless aspirates, i.e. a system identical to that which underlay the Greek system, cf. MEILLET-VENDRYES: 1968, 71. In general, the positing of voiceless fricatives in place of the Voiced Aspirates in Proto-Indo-European, together with Plain Voiced and Voiceless Stops, while a possible *a priori* solution to the problem of the typological plausibility of the original obstruent system, is not supported by evidence from outside the Italic group, and requires the radical change from voiceless fricatives to voiced stops over a very wide area of the Indo-European territory. In many cases, one stage of this transformation would require the widespread existence of voiced fricatives without corresponding voiceless fricatives. Far from simplifying the details of the Germanic Sound Shift, the assumption of voiceless fricatives (even in "Pre-Germanic", cf. PROKOSCH: 1939, 53) makes the Germanic developments almost incomprehensible. Certainly the chronology proposed by

Prokosch himself, in which the first stage (properly speaking, the pre-stage) is the voicing of the fricatives, cannot be accepted, for it would leave Germanic at this period with a system of obstruents consisting of un-voiced and voiced stops, and voiced fricatives only (except for /s/) (1). The alternatives are almost as bad. The change /p t k/ > f þ x/ will yield a system in which two sets of voiceless fricatives are in contrast. It is very hard to imagine what phonological features could be used to separate these two sets. For Prokosch they would be tenseness and laxness, but it may seriously be doubted whether a language could have a thorough-going and consistent contrast between tense and lax fricatives. Perhaps the best that one could do would be to posit as the initial step the aspiration of voiceless stops ($p\ t\ k > p^h\ t^h\ k^h$) followed by occlusivization of the fricatives (*f þ x* > *p t k*). The resultant obstruent system must in the next stage switch the voiced and voiceless sounds around, so that Germanic voiced stops/fricatives must come from voiceless stops, and Germanic voiceless stops derive from original voiced stops. The assumption of this change, which is just credible, removes the system still further from one of the prime motives for positing fricatives in Proto-Indo-European: to account for the supposed voiced fricatives of Germanic, which must now be derived by subsequent fricativization of the new voiced stops. If we agree to retain the view of initial voiced fricatives in Proto-Germanic, then, they must have developed from Indo-European fricatives by a complex chain of events: /f/ > /p/ > /b/ > /ƀ/.

Now of course we cannot prove that none of this happened. It is especially important to recall that our view of apparently sweeping linguistic events such as the Germanic Sound Shift is colored by our confidence in the two most important givens: an initial point with one system and an end point with another. When we make statements, or formulate rules, such as " voiceless stops became voiceless fricatives ", we are asserting the beginning and the end of the process in a way which is necessarily simplistic. Often we can surmize certain rather broad details, such as an intermediate stage of aspiration. But in the absence of real documentation we can only guess at the complex interplay of the phonetic environments and hierarchies of points of articulation, not to mention dialectal variation, which have as their outcome the transformations stated so confidently in the handbooks. Vennemann's excellent study of the High German Sound Shift (1972) suggests in detail how a highly marked phonological system can come into being and sustain itself. If Prokosch's proposal for pre-Germanic, with its /t d ð/ (etc.), seems improbable as a single synchronic stage in any language, this does not mean that temporary imbalances in the distribution of voiced and voiceless fricatives did not exist. The voicing of fricatives and the spirantization of voiceless stops might have occurred step by step at each point of articulation and in restricted phonetic environments. An initial point in such a process might, for example, have been the change $x > \gamma$ between vowels, followed by $k > x$ in the same environment. Neither of these changes is unexpected, and it is possible to project this type of change into the large-scale systematic changes which comprized the Sound Shift. Yet the generalization of the intervocalic voiced allophones to the initial position must still be accounted for, and the most that can be said in its favor is that it is possible; there is no evidence for such a change. There is nothing inherently unstable about voiceless fricatives which would make the shift linguistically probable. It is significant that in the many attested cases of voiceless fricatives changing into stops, the resultant stops are invariably voiceless, unless some special condition prevails. Finally, the substitution of voiceless fricatives for Voiced Aspirates does not make the well-known sound changes of the Indo-European dialects, such as GRASSMAN's Law, BARTHOLOMAE's Law, the Germanic Sound Shifts, any more intelligible than they were before; it explains only Italic, and that at considerable cost in accounting for the otherwise universal appearance of stops in the Indo-European dialects.

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(1) See note 2 p. 60.

IV. Another attempt to rectify the unbalanced stop system by reinterpreting the Voiced Aspirates was to ascribe to this series stop articulation with some special laryngeal action by which they would remain in contrast with the voiced stops. The comparison with Semitic 'emphatic' consonants was crucial here, because most of the Semitic languages have (or had) voiceless stops and two sets of voiced stops one of which is velarized or pharyngealized. HAMMERICH (1955 and 1967, e.g.) posits " laryngealized " stops which became voiced aspirates in Indic. It is not clear from his description what precise phonetic properties this series was supposed to have possessed, since his parallels are drawn from German interjections such as *UhUh!* (expression of cold). We cannot be sure, then, whether these sounds which he describes as laryngealized are murmured, constricted, velarized, or modified with some other glottal feature. Since HAMMERICH does mention the Semitic emphatics, however, we may assume that his *B D G* (etc.) represent pharyngealized voiced stops. A similar conclusion was apparently reached by KURYŁOWICZ (1964, esp. p. 13), who after discussing BARTHOLOMAE's Law in the light of the PIE root structure constraint which forbade the occurrence of both a voiceless stop and a voiced aspirate in the same root, remarks: " It is worth mentioning that if we replace the voiced aspirates by emphatic stops we get similar laws of root-structure for Akkadian. " KURYŁOWICZ does not make it explicit that emphatic stops are to be regarded as the predecessors of IE Voiced Aspirates, but it is difficult to place a different interpretation on this comment.

In Kuryłowicz's view, Bartholomae's Law, by which consonant clusters of the type *bh* + *t* are realized in Indic as *bdh,* is an extension of a general IE principle. Voicing assimilation in Indo-European is generally regressive; the cluster *g* + *t* became *kt,* not *gd* (cf. Greek *zugon, zuktos,* etc.). It follows that the PIE phonemes *bh, dh,* etc., were not *phonemically* voiced, but were non-distinctively voiced like the resonants *m, n, r,* and *l.* The incompatibility between a voiceless and an aspirated stop within the same root, which prevented the occurrence in PIE of roots such as **peudh-*, reflects the same kind of assimilation: a prior aspirated stop causes aspiration of all subsequent stops in a form, including root determinatives and suffixes.

Kuryłowicz's suggestion is an important one in that it points to the special phonological status of the Voiced Aspirates, which had the property of affecting the phonetic features of both neighboring and nonadjacent obstruents. The parallel with the Semitic emphatics is not valid, however, in this instance, as far as Akkadian is concerned. The section of von Soden's *Grundriss der akkadischen Grammatik* cited by Kuryłowicz (sec. 51 e) involves Geer's Law, by which Semitic sequences of two emphatics are simplified in Akkadian to emphatic + simple consonant; cf. also Moscati *et al.*, 1964, 74-75, and Reiner, 1966, 41. There is, I believe, an important parallel to this law in Indo-European, namely the constraint against two Plain Voiced stops (see below). An example such as Akkadian *qatnu* " thin ", Semitic root *q-ṭ-n* (with the two emphatics *q* and *ṭ*), shows that in Akkadian there was once progressive *dis*similation of emphatics; the closest Indo-European parallel in the case of the Voiced Aspirates is thus Grassmann's Law rather than Bartholomae's Law, if we are to equate Semitic emphatics with Indo-European Voiced Aspirates. While it is possible that Bartholomae's Law may turn out to be of Proto-Indo-European date, as Kuryłowicz suggests (1964: 13), it is very hard to see how the dissimilation of aspirates can in principle be assigned to the proto-language, since if anything the preference in biconsonantal roots was to have two Voiced Aspirates. Whatever advantages the equation of Indo-European Voiced Aspirates with emphatics of the Semitic variety may have, such as resolving the typological dilemma of an obstruent system containing two sets of voiced opposed to one set of unvoiced stops, it apparently cannot be used as a solution to problems of Indo-European phonology. A further drawback insofar as the direct parallel with Semitic is concerned is that the Proto-Semitic emphatics are markedly defective in their distribution, being restricted to interdentals, dental stops and fricatives, and velar stops (Moscati *et al.*, 1964, 24); such defectiveness is probably typical of languages having pharyngealized sounds, and is not at all characteristic of the Indo-European Voiced Aspirates, which are copiously represented at all points of articulation.

V. This last point raises a general question about the Voiced Aspirates, namely their obviously central role in the Proto-Indo-European obstruent system. One might almost think of the Voiced Aspirates as being the dominant phonemes of this class. The BARTHOLOMAE's Law phenomena discussed above, taken together with KURYŁOWICZ's suggestion that the preference in PIE biconsonantal roots for two Voiced Aspirates is an extension of this law, raise at least the possibility that some kind of neutralization rule operated in Proto-Indo-European to convert roots of the type /peudh-/ into /bheudh/. If this was so, then the Voiced Aspirates were in some respects unmarked, at least as opposed to the Plain Voiced stops, which had the opposite tendency to *dissimilate* within a root. The statistics assembled by JUCQUOIS (1966) show that of the PIE stops, the overwhelming preference is for voiceless stops. The lexical roots which can be recovered from POKORNY's *Idg. Etym. Wb.* yield a total of 713 occurrences of Voiceless stops, as opposed to 348 Voiced Aspirates. The total number of (unaspirated) Voiced stops is 259. The proportion among the three sets is therefore approximately 6:3:2. Unfortunately we cannot, of course, make a token-count of these phonemes in a text. The count made by WHITNEY (summarized in the *Sanskrit Grammar,* p. 26) of token occurrences of Sanskrit phonemes, showing for example that the frequency of voiced aspirates to unaspirated voiced stops in the dental series was .83%/2.85%, surely reflects the later expansion of plain voiced stops as a result of external sandhi, GRASSMANN's Law, and other Indic processes. But JUCQUOIS' type-count does suggest that if there is a hierarchy of markedness among the PIE stops, it was the Plain Voiced stops which were highest marked, rather than the Voiced Aspirates. This conclusion is supported by the fact that unaspirated Voiced stops are never the target of a neutralization; in this respect they are unlike the Voiceless stops, and possibly unlike the Voiced Aspirates (depending on whether BARTHOLOMAE's Law can be projected back into PIE).

Yet the trend in discussing the nature of the PIE stops has focused on the Voiced Aspirates as being anomalous in some way. The existence of a basic contrast in the stop system between voiced and voiceless stops seemed assured; the awkward members of the system were the sounds which were voiced *and* aspirated, and which contrasted with the Plain Voiced stops only in aspiration. SZEMERÉNYI (1970: 135) regards the Voiced Aspirates as phonological rarities, and ascribes their presence in PIE to earlier combinations of voiced stops with /h/ (1970: 137). The assumption that voiced aspirate stops are phonologically anomalous is not in fact supported. LADEFOGED (1971: 12-14) lists numerous languages in which these sounds occur, and they are by no means restricted to the South Asian subcontinent. Partially voiced, or murmured stops, which if not identical with " voiced aspirates " can easily be posited as their predecessors, are in fact probably quite common in the world's languages; their existence in Armenian, for example, has been recognized only fairly recently (e.g. VOGT, 1956). (See also SHERARD 1972 for " voiced aspirates " in Shanghainese.) Probably the existence of this kind of voicing action is often either not noticed or disregarded in the descriptions of languages where they occur but are not in contrast with fully voiced stops. The rarity of " voiced aspirates " is, then, not so much in their distribution over the world's languages, but their appearance in contrast with voiced stops of other kinds. It must be stressed that JAKOBSON's implicational universal states that voiced aspirates imply the existence of a contrast between aspirated and unaspirated stops *only* if there is also a plain voiced occlusive series; to quote JAKOBSON once again: " ... no language adds to the pair /t/-/d/ a voiced aspirate without having its voiceless counterpart /t^h/ ... ".

It is thus obvious that one alternative to the traditionally accepted proto-system which would not involve projecting the Indo-Iranian voiceless aspirates back into Proto-Indo-European would be to retain the voiced aspirates and have the Plain Voiced stops as voiceless stops. Two ways of doing this have the best promise of success: 1) the PIE Plain Voiced stops were glottalized, and 2) the PIE Voiceless stops were aspirated and the Plain Voiced stops were unvoiced and unaspirated.

VI. Both of these solutions involve the assumption of a widespread change in dialectal Indo-European from unaspirated voiceless stops into voiced stops. The situation is by no means parallel, however, to that of the supposed voiceless fricatives of PROKOSCH, which occur with certainty only in Italic. The presumed change of plain voiced stops to voiceless stops is needed for the Germanic and Armenian sound shifts, and in Anatolian and Tocharian also. Consequently there is support for original voiceless stops from several divergent dialects. Against the hypothesis speaks the appearance of voiced stops in Greek and Sanskrit, and the merger of this set with the Voiced Aspirates, which points to original voicing, in a considerable number of other dialects. Once again, conformity to the typological norm promises to be costly. At the same time, however, there are several independent indications in support of the theory that the plain voiced stops which appear in Greek and Sanskrit in contrast to aspirated stops are secondary.

The best known attempt to account for the PIE Plain Voiced Stops as having been originally unvoiced is that of Holger PEDERSEN (1951). In his short monograph *Die gemeinindoeuropäischen und vorindoeuropäischen Verschlusslaute,* PEDERSEN suggested that the absence of a labial stop in the IE Plain Voiced series could best be accounted for by the assumption that these stops were originally unvoiced, correctly pointing out the rather widespread tendency, both within and without Indo-European, for voiceless labials to be absent. Unfortunately, PEDERSEN's solution involves a complex subsequent shift whereby 1) plain voiced stops became voiceless; 2) voiceless aspirated stops became voiced; and 3) unaspirated voiceless stops became voiced, i.e. $d > t$, $t^h > d^h$, $t > d$ (PEDERSEN, 1951: 12-16). Such an involved solution seems too high a price to pay for the resolution of the problem of the absence of PIE **b*, and seems to be motivated by an attempt to account for the aspiration feature of the Voiced Aspirates. As I have pointed out, this feature is easily accounted for if the predecessors of these sounds were voiced stops, perhaps pronounced with murmured glottal action. The lax voiceless stops which became Indo-European voiced stops would then comprize the only series which changed its glottal feature. Such a solution was proposed by Joseph EMONDS (1971) in his article A reformulation of Grimm's Law.

The indications that the Plain Voiced stops were originally glottalized sounds have been stated in two recent articles (HOPPER, 1973; GAMKRELIDZE and IVANOV, 1973). GAMKRELIDZE and IVANOV suggest that the absence of PIE **b* is indicative of glottalization because glottalized labial stops are commonly absent in phonemic systems containing voiced, voiceless aspirated, and glottalic stops, whereas if the unaspirated voiceless members are not glottalized, there is a tendency for the aspirated labial stop to be missing. Both articles referred to point out the widespread tendency for languages having glottalized consonants to avoid having more than one such consonant per word. This constraint is found in some of the Caucasian languages, for example (GAMKRELIDZE and IVANOV: 1973, 153); it is also a feature of many other languages having glottalized phonemes, for example Hausa, Quechua, Yucatec Maya (cf. HOPPER, 1973, for references), also the Salish (British Columbia) language Shuswap (KUIPERS 1970: 48), and Akkadian, provided the Akkadian " emphatics " are interpreted as glottalized consonants (cf. p. 65 above for references); the development of this constraint in Akkadian, incidentally, suggests in turn that the controversy over the interpretation of the Proto-Semitic Emphatics must be settled in favor of ejective sounds.

The most serious obstacle in the way of the ejective interpretation of the Plain Voiced stops is undoubtedly the necessity to posit a widespread change in the Indo-European dialects from ejective to voiced stop. The loss of the glottalic feature is not an uncommon event in languages which possess ejectives (GREENBERG, 1970: 140), but by far the usual change is to a plain voiceless, rather than a voiced, stop. MARTINET, in the *Économie des changements phonétiques,* suggests an apparently hypothetical train of events whereby an ejective could become a plain voiced stop:

> Nous pouvons, par ailleurs, imaginer un passage de /t'/ à /'d/ par anticipation progressive de la voix d'une voyelle suivante, et même, en fin de compte, un aboutissement /d/ si la sonorité s'étend finalement à tout le phonème (113-114).

Of particular interest is the discovery of such a change in certain Caucasian languages claimed by GAMKRELIDZE and IVANOV (1973: 154). Not only does this provide a precedent for the change from /t'/ to /d/, but it also adds the interesting possibility that the change is characteristic of the Caucasian area, and thus provides some support for locating the Indo-European homeland in the area of the Black Sea and the Caucasus.

In postulating a series of glottalized consonants in PIE, we must also look for traces of other phonetic entities which often accompany these sounds. Very many languages which have consonant series of the type /t/-/t'/-/d/ also have the glottal stop as a phoneme, and also a contrast between velars and uvulars (or post-velars) (1). Such post-velar sounds might also have been labialized, labialization serving both to maximally extend the oral cavity and to distinguish velars from post-velars. The high degree of labialization characteristic of Kabardian labio-velars (cf. KUIPERS, 1960: 21), if assumed also for PIE, would account for the occasional appearance of pure labials as reflexes of Labio-Velars in some of the dialects (e.g. Italic, Celtic, Greek).

Evidence for the glottal stop is less direct. However, it is interesting that in some languages with glottalized consonants and a phonemic glottal stop, the cluster of plain voiceless stop + glottal stop is realized as a sound not distinct phonetically from a glottalized (ejective) stop, i.e. /t/ + /ʔ/ > [t']. Some of the instances of unexplained voicing in the dialects might be susceptible of explanation along these lines. HOENIGSWALD (1965: 95-96) points to the well-known sandhi rule of Sanskrit whereby a final voiceless unaspirated stop becomes voiced before a following word-initial non-obstruent, " despite the fact that external sandhi is in principle based on the pause form and that both -ta- and -da- occur internally ". HOENIGSWALD's laryngeal explanation of this rule involves positing a *voiced* laryngeal as an original initial before every non-obstruent, or at least a highly unlikely analogical replacement by a voiced laryngeal in every form beginning with a vowel or sonant. If the laryngeal explanation has to be brought to bear on this Sanskrit rule, a much more plausible origin would be a (possibly non-phonemic) initial glottal stop, resulting in the sequence *-t* #ʔ*a-* (and hence eventually *-t'a-* > *-da-*).

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Another instance perhaps susceptible of explanation by the Glottalic Theory is the often discussed form Skt. *pibati* (and its cognates Old Irish *ibid,* Latin *bibo*). The standard laryngealist explanation for these forms assumes a root consisting of a voiceless stop /p/ and a voiced laryngeal such as /γ/. The zero grade form of this root would then be *pγ,* yielding the medial /b/ by voicing assimilation and subsequent disappearance of the laryngeal. This solution, which has fallen into disfavor recently, can be revived by positing, in place of the voiced laryngeal, the glottal stop, and assuming an original full-grade root **peʔ*. The zero-grade form of such a root would be **pʔ,* and the underlying form of the Sanskrit reduplicated present can be reconstructed as **pi-pʔeti*. Such an explanation accounts for the most serious disadvantage of the 'voiced laryngeal' theory of *pibati* (etc.), namely that a sequence */*p* + γ/ ought most certainly to have yielded a Voiced Aspirate rather than a Plain Voiced stop, cf. WINTER: 1965, 107, and POLOMÉ, 1971, on this question (1).

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